



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,202	10/01/2003	David M. Mills	132147-2 (GERD:0566)SWA	7118
41838 7590 10/05/2009 GENERAL ELECTRIC COMPANY (PCPI) C/O FLETCHER YODER P. O. BOX 692289 HOUSTON, TX 77269-2289			EXAMINER RAMIREZ, JOHN FERNANDO	
			ART UNIT 3737	PAPER NUMBER
			MAIL DATE 10/05/2009	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/676,202	<b>Applicant(s)</b> MILLS ET AL.	
	<b>Examiner</b> JOHN F. RAMIREZ	<b>Art Unit</b> 3737	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09/11/08.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-9,11-18,39-42 and 44-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-9,11-18,39-42 and 44-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments, see remarks, filed 9/11/08, with respect to the rejection(s) of claim(s) 1 and 45 under sections 102(e)/103(a) have been fully considered. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Additionally, patentability for the claims is yet opposed since the prior art in terms of Rafter et al and Dreschel et al is yet evidencing that artisans entertained MUT array elements as interchangeable with single crystal-derived piezoelectric array elements and subject to the same conventional lens and backing layering and associated electronics.

Moreover, the new prior art of Friemel et al (US 2003/0055308) and previously used reference Friemel et al (US6,537,220) clearly discloses the use of a curved acoustic lens mounted over the array face in both the azimuth and elevation directions ( see claim 10 and abstract of the Friemel et al (US2003/0055308); also see claims 9,10 and abstract of the Friemel et al (US6,537,220)).

### ***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

Art Unit: 3737

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-2, 8, 16, 42 and 45 are rejected under 35 U.S.C. 102(e) as anticipated by Rafter et al (US6425869), or in the alternative under 35 USC 103(a) as obvious based upon Rafter et al in view of Dreschel et al (US6605043), or Friemel et al (2003/0055308) or Friemel et al (US6,537,220).**

The former teaches a cMUT embodiment associated with Fig. 6 and col. 13 - 14 top lines where the curved partially cylindrical lens 210 depicted in Fig. 2 in association with the single piezocrystal multi-element diced design may be assumed to be also

Art Unit: 3737

used with the MUT variant which is stated to be interchangeable therewith. In the alternative, Dreschel et al similarly teaches that a lens may be attached to a cMUT array per col. 9 - 10 discussion considered together with col. 8 lines 62 - 65, albeit that the lens is not explicitly stated to be curved.

Also the Friemel et al. patent teaches an acoustic lens mounted over the array face (see claim 10). The lens is preferably curved in both the azimuth and elevation directions (abstract). It would have been obvious in view of the latter col. 2, lines 7-14 to do so since this would allow the subarrays to be independently focusable.

**Claims 3- 4, 9 and 46 are rejected under 35 U.S.C. 103(a) based on the references as applied to claim 1 above, and further in view of Ishrak et al (US5667491)** which evidences via element 502 of Figs. 5A-5B that a lens as in the former would be held on to the array by adhesive so it doesn't fall off. Such an epoxy layer would be a chemical barrier to diffusion in relation to the direct contact state such as by clamping the lens perimeter.

**Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rafter et al alone or further in view of Dreschel et al, or Friemel et al references as applied to claim 1 above, and further in view of Fraser (US6328696)** insofar as whereas the former are silent as to grouping of cMUTs together, it would have been obvious in view of the latter col. 3 lines 37 - 38 to do so since as manufactured they are of small size however they may be operated as larger functional units.

**Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 2 above, and further in view of Hanafy (US6258034, of record) as applied for its lens detail teaching per page 3 para first of the prior Office action on the merits.**

**Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above, in either case further in view of Ishrak et al as applied to claim 9 above, and further in view of Eaton et al (US5876345) as the latter was applied for its silicate/adhesion teachings per arguments page 4 of the prior 1/2006 Office action.**

**Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable the references as applied above, in either case Ishrak et al as applied to claim 9 above, and further in view of Snow (US6749554, of record) as the latter was applied on page 4 of the said prior action.**

**Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Robinson (US6659954) since the latter taught col. 2 lines 1 - 10 to use pMUT arrays as an equivalent for ultrasound array fabrication.**

**Claim 18 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Friemel et al references as applied to claim 1 above, and further in view of Barnes et al insofar as whereas the former indicates generally that the cMUT array may be patterned with its switches onto silicon, the latter extends this per col. 4 lines 54-67 and col. 8 line 66 - col. 9 line 37 to CMOS fabrication within the silicon wafer.**

**Claims 39-40 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, in either case further in view of Fraser as discussed in relation to the claim 6 above, further in view of Chiao et al (US5882309) or Mason et al (US5931785) insofar as the latter respectively enhance the former interconnection teachings re 1.5D configuration by noting respectively col. 3 lines 15 - 38 and col. 7 lines 41 - 59 that transducers are hardwired or permanently connected in elevational pairs because the delay operation is symmetric in that case. Otherwise Barnes et al teaches the CMOS switch embedding within the silicon substrate, Friemel et al otherwise teaches that a mechanical lens such as in Barnes et al may be of curved type and in proximity to the MUT cells. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rafter et al alone or further in view of Dreschel et al, in either case further in view of Fraser further in view of Chiao et al or Mason et al as applied to claim 39 above, and further in view of Robinson, for reasons paralleling the argument against claim 17.**

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN F. RAMIREZ whose telephone number is (571)272-8685. The examiner can normally be reached on (Mon-Fri) 7:00 - 3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3737

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRIAN CASLER/  
Supervisory Patent Examiner, Art  
Unit 3737

/J. F. R./  
Examiner, Art Unit 3737